

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

CONARD, Richard, D.
Barnes & Thornburg
11 South Meridian Street
Indianapolis, IN 46204
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 30 August 2001 (30.08.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 20568-64504	
International application No. PCT/US00/00032	International filing date (day/month/year) 03 January 2000 (03.01.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address

CHROMATIS NETWORKS, INC.
Suite 806
Three Bethesda Metro Center
Bethesda, MD 20814
United States of America

State of Nationality

US

State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address

CHROMATIS NETWORKS, INC.
Suite 500
450 Spring Park Place
Herndon, VA 20170
United States of America

State of Nationality

US

State of Residence

US

Telephone No.

(703) 689-2985

Facsimile No.

(703) 481-7333

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

François BAECHLER

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: RICHARD D. CONARD
BARNES & THORNBURG
11 SOUTH MERIDIAN STREET
INDIANAPOLIS, IN 46204

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of Mailing (day/month/year) 26 APR 2000	
Applicant's or agent's file reference 20568-64504	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US00/00032	International filing date (day/month/year) 03 JANUARY 2000
Applicant CHROMATIS NETWORKS, INC.	

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.
- Filing of amendments and statement under Article 19:**
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):
- When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.
- Where?** Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35
- For more detailed instructions, see the notes on the accompanying sheet.
2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
4. **Further action(s):** The applicant is reminded of the following:
- Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 *bis* 1 and 90 *bis* 3, respectively, before the completion of the technical preparations for international publication.
- Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).
- Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized Officer
LUCKY QUOC NGO

Telephone No. (703) 305-4798

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 20568-64504	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US00/00032	International filing date (day/month/year) 03 JANUARY 2000	(Earliest) Priority Date (day/month/year) 12 JULY 1999
Applicant CHROMATIS NETWORKS, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
2. ☐ Certain claims were found unsearchable (See Box I).
3. ☐ Unity of invention is lacking (See Box II).
4. With regard to the title,
- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,
- ☐ the text is approved as submitted by the applicant.
- ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is Figure No. 1
- ☒ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.
- ☐ None of the figures.

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US00/00032**Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)**

A method for supporting VP/VC groups in asynchronous transfer mode (ATM) switching systems (12) that implement ATM automatic protection switching (APS). A source (SA) transmits traffic substantially continuously on two paths (14, 16) and a destination (SB), or sink, selects at any time one of the traffic from only one of the paths (14, 16) for further processing. The method includes creating a groups table having an entry for each of the two instances of every active VP/VC group's member set. Each entry indicates whether the cells for that instance of the member circuits of that VP/VC group should be forwarded or discarded. Each entry references a corresponding entry in the groups table by means of a pointer. The method includes accessing a relevant entry in the groups table when a cell for that circuit arrives, discarding the cell if the accessed value is "discard," forwarding the cell as specified in the specific lookup table entry for that circuit if the accessed value is otherwise. Protection switching for a group requires only changing the value of the corresponding two entries in the groups table, a single operation regardless of the number of member circuits in the group.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/00032

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :H04L 12/54

US CL :370/228, 235, 395, 396, 425

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/225, 228, 235, 236, 237, 395, 397, 409, 400, 412, 428, 429, 396, 429

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NoneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,715,237 A (AKIYOSHI) 03 February 1998, cols. 3-12, 15, & 19-20.	1-7
A	US 5,870,382 A (TOUNAI et al) 09 February 1999, abstract.	1-7
A	US 5,663,949 A (ISHIBASHI et al) 02 September 1997, abstract.	1-7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

10 MARCH 2000

Date of mailing of the international search report

26 APR 2000

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

RICKY QUOC NGO

Telephone No. (703) 305-4798

file 8/13/01

PATENT COOPERATION TREATY

RECEIVED

AUG 13 2001

BARNES & THORNBURG

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: RICHARD D. CONARD
BARNES & THORNBURG
11 SOUTH MERIDIAN STREET
INDIANAPOLIS, IN 46204

PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing
(day/month/year)

09 AUG 2001

Applicant's or agent's, file reference

20568-64504

IMPORTANT NOTIFICATION

International application No.

PCT/US00/00032

International filing date

(day/month/year)
03 JANUARY 2000

Priority Date (day/month/year)

12 JULY 1999

Applicant

CHROMATIS NETWORKS, INC.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

RICKY QUOC NGO

Telephone No. (703) 305-4798

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20568-64504	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US00/00032	International filing date (day/month/year) 05 JANUARY 2000	Priority date (day/month/year) 12 JULY 1999
International Patent Classification (IPC) or national classification and IPC IPC(7): H04L 12/54 and US Cl.: 370/228, 235, 395, 396, 425		
Applicant CHROMATIS NETWORKS, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 27 JUNE 2000	Date of completion of this report 05 FEBRUARY 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer RICKY QUOC NGO <i>Randy Ward</i>
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4798

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US00/00032

I. Basis of the report

1. With regard to the elements of the international application:*

☒ the international application as originally filed☒ the description:

pages 1-5, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the claims:

pages 6, as originally filed

pages NONE, as amended (together with any statement) under Article 19

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the drawings:

pages 1, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the sequence listing part of the description:

pages NONE, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☒ The amendments have resulted in the cancellation of:☒ the description, pages NONE☒ the claims, Nos. NONE☒ the drawings, sheets/fig. NONE5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. statement**

Novelty (N)

Claims	<u>1-7</u>	YES
Claims	<u>NONE</u>	NO

Inventive Step (IS)

Claims	<u>1-7</u>	YES
Claims	<u>NONE</u>	NO

Industrial Applicability (IA)

Claims	<u>1-7</u>	YES
Claims	<u>NONE</u>	NO

2. citations and explanations (Rule 70.7)

Claims 1-7 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest the steps of creating a groups table having entry for each of the two instances of every active VP/VC group's member set, wherein each entry indicates whether the cells for that instances of the member circuits of that VP/VC group should be forwarded or discarded, and references a corresponding entry in the groups table by means of pointer; accessing a relevant entry in the groups table when a cell for that circuit arrives; discarding the cell if the accessed value is discard; and forwarding the cell otherwise.

Claims 1-7 also meet industrial applicability because the invention relates to protection of conventional ATM switching networks in the event of physical faults in the networks.

____NEW CITATIONS____
NONE

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum)

20568-64504

Box No. I TITLE OF INVENTION

EFFICIENT SUPPORT FOR VP/VC GROUPS

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CHROMATIS NETWORKS, INC.
Three Bethesda Metro Center, Suite 700
Bethesda, MD 20814
US

☐ This person is also inventor.

Telephone No.

(301) 664-8499

Facsimile No.

(301) 657-9776

Teleprinter No.

State (that is, country) of nationality:
USState (that is, country) of residence:
USThis person is applicant
for the purposes of:☐ all designated
States☒ all designated States except
the United States of America☐ the United States
of America only☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

OREN, Yair
13 Dissenchik Street
Tel-Aviv
IL 69353

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box
is marked, do not fill in below.)State (that is, country) of nationality:
ILState (that is, country) of residence:
ILThis person is applicant
for the purposes of:☐ all designated
States☐ all designated States except
the United States of America☒ the United States
of America only☐ the States indicated in
the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

CONARD, Richard D.
BARNES & THORNBURG
11 South Meridian Street
Indianapolis, IN 46204
US

Telephone No.

(317) 236-1313

Facsimile No.

(317) 231-7433

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☐ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input type="checkbox"/> AE United Arab Emirates | <input type="checkbox"/> LR Liberia |
| <input type="checkbox"/> AL Albania | <input type="checkbox"/> LS Lesotho |
| <input type="checkbox"/> AM Armenia | <input type="checkbox"/> LT Lithuania |
| <input type="checkbox"/> AT Austria | <input type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input type="checkbox"/> LV Latvia |
| <input type="checkbox"/> AZ Azerbaijan | <input type="checkbox"/> MA Morocco |
| <input type="checkbox"/> BA Bosnia and Herzegovina | <input type="checkbox"/> MD Republic of Moldova |
| <input type="checkbox"/> BB Barbados | <input type="checkbox"/> MG Madagascar |
| <input type="checkbox"/> BG Bulgaria | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input type="checkbox"/> BR Brazil | |
| <input type="checkbox"/> BY Belarus | <input type="checkbox"/> MN Mongolia |
| <input type="checkbox"/> CA Canada | <input type="checkbox"/> MW Malawi |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input type="checkbox"/> MX Mexico |
| <input type="checkbox"/> CN China | <input type="checkbox"/> NO Norway |
| <input type="checkbox"/> CR Costa Rica | <input type="checkbox"/> NZ New Zealand |
| <input type="checkbox"/> CU Cuba | <input type="checkbox"/> PL Poland |
| <input type="checkbox"/> CZ Czech Republic | <input type="checkbox"/> PT Portugal |
| <input type="checkbox"/> DE Germany | <input type="checkbox"/> RO Romania |
| <input type="checkbox"/> DK Denmark | <input type="checkbox"/> RU Russian Federation |
| <input type="checkbox"/> DM Dominica | <input type="checkbox"/> SD Sudan |
| <input type="checkbox"/> EE Estonia | <input type="checkbox"/> SE Sweden |
| <input type="checkbox"/> ES Spain | <input type="checkbox"/> SG Singapore |
| <input type="checkbox"/> FI Finland | <input type="checkbox"/> SI Slovenia |
| <input type="checkbox"/> GB United Kingdom | <input type="checkbox"/> SK Slovakia |
| <input type="checkbox"/> GD Grenada | <input type="checkbox"/> SL Sierra Leone |
| <input type="checkbox"/> GE Georgia | <input type="checkbox"/> TJ Tajikistan |
| <input type="checkbox"/> GH Ghana | <input type="checkbox"/> TM Turkmenistan |
| <input type="checkbox"/> GM Gambia | <input type="checkbox"/> TR Turkey |
| <input type="checkbox"/> HR Croatia | <input type="checkbox"/> TT Trinidad and Tobago |
| <input type="checkbox"/> HU Hungary | <input type="checkbox"/> TZ United Republic of Tanzania |
| <input type="checkbox"/> ID Indonesia | <input type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IL Israel | <input type="checkbox"/> UG Uganda |
| <input type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input type="checkbox"/> IS Iceland | |
| <input checked="" type="checkbox"/> JP Japan | <input type="checkbox"/> UZ Uzbekistan |
| <input type="checkbox"/> KE Kenya | <input type="checkbox"/> VN Viet Nam |
| <input type="checkbox"/> KG Kyrgyzstan | <input type="checkbox"/> YU Yugoslavia |
| <input type="checkbox"/> KP Democratic People's Republic of Korea | <input type="checkbox"/> ZA South Africa |
| | <input type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input type="checkbox"/> KZ Kazakhstan | |
| <input type="checkbox"/> LC Saint Lucia | |
| <input type="checkbox"/> LK Sri Lanka | |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)


Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) (12.07.99) 12 July 1999	60/143,402	US		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1)

* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY			
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):	
		Date (day/month/year)	Number Country (or regional Office)
ISA/ US			

Box No. VIII CHECK LIST: LANGUAGE OF FILING	
This international application contains the following number of sheets: request : 3 description (excluding sequence listing part) : 5 claims : 1 abstract : 1 drawings : 1 sequence listing part of description : 0 Total number of sheets : 11	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: (2) 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): Transmittal Letter to the US/RO Return Postal Card
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT	
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).	
 Richard D. Conard, Agent for Applicants	

For receiving Office use only	
1. Date of actual receipt of the purported international application: 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: 4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): ISA /	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

Form PCT/RO/101 (last sheet) (July 1998: reprint July 1999) See Notes to the request form

PCT

GENERAL POWER OF ATTORNEY

(for several international applications filed under the Patent Cooperation Treaty)

(PCT Rule 90.5)

The undersigned person(s) :

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

CHROMATIS NETWORKS, INC.
Three Bethesda Metro Center, Suite 700
Bethesda, MD 20814
US

hereby appoint(s) the following person as:



agent



common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

CONARD, Richard D.; COFFEY, William R.; HYLAND, Jerry E.; LAMMERT, Steven R.; REZEK, Richard A.;
NIEDNAGEL, Timothy E.; BREEN, John P.; WOODBURN, Jill L.; HARRISON, Nancy, J.; CARTER, R. Trevor;
KULKARNI, Dilip A.; QUICK, David B.; POWLICK, Jill T.; PALAN, Perry; NEWMAN, Mark M.;
GILLENWATER, Bobby B.; HUNT, Paul B.; GZYBOWSKI, Michael S.; GALLAGHER, Gerald T.; NULL,
Robert D.; MARTIN, Alice O.; All Appointed Agents of the Address:

BARNES & THORNBURG
11 South Meridian Street
Indianapolis, IN 46204
US

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with any and all international applications filed by the undersigned with the following Office

US

as receiving Office

and to make or receive payments on behalf of the undersigned.

Signature(s) (where there are several persons, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading this power):

Signature of Officer

Typed or Printed Name : Rafi Gidron

Title:

president

Date: 11 02 1999
Day/ Month/ Year

PCT

GENERAL POWER OF ATTORNEY

(for several international applications filed under the Patent Cooperation Treaty)

(PCT Rule 90.5)

The undersigned person(s) :

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

OREN, Yair
13 Dissenchik Street
Tel-Aviv
IL 69353

hereby appoint(s) the following person as:

☒ agent

☐ common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

CONARD, Richard D.; COFFEY, William R.; HYLAND, Jerry E.; LAMMERT, Steven R.; REZEK, Richard A.; NIEDNAGEL, Timothy E.; BREEN, John P.; WOODBURN, Jill L.; HARRISON, Nancy, J.; CARTER, R. Trevor; KULKARNI, Dilip A.; QUICK, David B.; POWLICK, Jill T.; PALAN, Perry; NEWMAN, Mark M.; GILLENWATER, Bobby B.; HUNT, Paul B.; GZYBOWSKI, Michael S.; GALLAGHER, Gerald T.; NULL, Robert D.; MARTIN, Alice O.; All Appointed Agents of the Address:

BARNES & THORNBURG
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to represent the undersigned before

☒ all the competent International Authorities

☐ the International Searching Authority only

☐ the International Preliminary Examining Authority only

in connection with any and all international applications filed by the undersigned with the following Office

US

as receiving Office

and to make or receive payments on behalf of the undersigned.

Signature(s) (where there are several persons, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading this power):

Yair OREN

Date: 7 2 1999
Day/ Month/ Year

EFFICIENT SUPPORT FOR VP/VC GROUPS

Field of the Invention

This invention relates to protection of networks in the event of physical faults in the networks, such as breaks in network connections. It is disclosed in the context of an efficient method for supporting virtual path/virtual channel (VP/VC) groups in asynchronous transfer mode (ATM) switching systems that implement ATM automatic protection switching (APS). However, the invention is believed to be useful in other applications as well.

10

Background of the Invention

ATM APS is described in the I.630 specification of the International Telecommunications Union (ITU-T). ATM APS provides a mechanism for quick recovery from physical faults, akin to APS mechanisms used in synchronous optical networks (SONETs). The protected entity in this case is an ATM VP or VC circuit. A description of ATM APS as specified by ITU-T specification I.630 will aid in understanding the invention.

Referring to Fig. 1, consider an ATM network with arbitrary topology, and an ATM circuit (either VPC or VCC) extending from a node A to a node B, where node A is connected to a switching system S_A and node B is connected to a switching system S_B . In the context of traffic flow from A to B, the protection domain for this circuit extends from S_A to S_B . S_A is sometimes referred to as the source for the protection domain of the circuit. S_B is sometimes referred to as the sink for the protection domain of the circuit. Other nodes on the paths between source and sink are sometimes referred to as intermediate nodes along the protected circuit.

25

ITU-T specification I.630 describes two different types of protection, so-called "1+1" protection, in which the source transmits (multicasts) the traffic constantly on both paths and the sink selects at any time one of the incoming traffic streams and forwards it to the egress, and so-called "1:1" protection, in which the source transmits the traffic on only one of the paths. When that path becomes disconnected, the source switches to transmit on the alternate path. An intermediate node that senses a problem on its associated path notifies the sink node using the AIS

30

operations and maintenance (OAM) cell. The sink then effects a protection switch (1+1 protection) or notifies the source that the source should switch to the alternate path(1:1 protection).

5 Disclosure of the Invention

According to the invention, a method is provided for supporting VP/VC groups in ATM switching systems that implement ATM APS in which traffic flows substantially continuously from a source on two paths and a destination selects traffic from only one of the paths at a time for further processing. The method
10 includes creating a groups table having an entry for each of the two instances of every active VP/VC group's member set. Each entry indicates whether the cells for that instance of the member circuits of that VP/VC group should be forwarded or discarded. Each entry references a corresponding entry in the groups table by means of a pointer. The method includes accessing a relevant entry in the groups table when
15 a cell for that circuit arrives, discarding the cell if the accessed value is "discard," and forwarding the cell otherwise. Protection switching for a group thus requires only changing the values of the corresponding two entries in the groups table, a single operation regardless of the number of member circuits in the group.

Illustratively according to the invention, forwarding the cell includes
20 maintaining a lookup table containing entries for forwarding cells, and forwarding the cell as specified in the specific lookup table entry for that circuit.

Further illustratively according to the invention, creating the groups table includes implementing the groups table as part of the circuitry of the switching system.

25 Additionally illustratively according to the invention, the method includes determining the number of supported groups in part based upon the size of the groups table.

Illustratively according to the invention, the method includes determining the number of supported groups in part based upon the number of bits
30 allocated to the groups table pointer in the lookup table entry.

Further illustratively according to the invention, accessing a relevant entry in the groups table when a cell for that circuit arrives includes accessing a relevant entry in the groups table when a non-zero value of the pointer field arrives.

5 Additionally illustratively according to the invention, accessing a relevant entry in the groups table when a cell for that circuit arrives includes determining that VC circuit's or VP circuit's forward/discard status should be determined from the lookup table entry itself when a value of zero in the pointer field arrives, indicating that the corresponding VC circuit or VP circuit is not a member of a group.

10

Brief Description of the Drawings

The invention may best be understood by referring to the following detailed description and accompanying drawing which illustrates the invention. The drawing is a highly diagrammatic illustration of a system incorporating the invention.

15

Detailed Descriptions of Illustrative Embodiments

Referring now to the drawing, in the context of 1 + 1 protection, there is a need for a mechanism by which any failure in the network 12 connecting S_A to S_B will not disrupt the traffic flow between A and B. In order to achieve that, two diverse paths, or circuits, 14, 16 in the network 12 need to be established between S_A and S_B . If one of the paths 14, 16 is disconnected, traffic can still flow through the other path. Protecting each circuit between a source and a sink individually works well when the number of circuits is relatively small. When the number of circuits is very large, for example, in the tens of thousands, monitoring each circuit for AIS notifications and protection switching consumes substantial network 12 capacity. In many networks 12, many circuits follow the same path in the network 12 from end to end, and are thus similarly affected by any network fault. For these reasons, ITU-T specification I.630 groups circuits into VP/VC groups.

30 A VP/VC group is a set of VP circuits (VPCs) and VC circuits (VCCs - both VCCs and VPCs may be members of the same set) which are all associated with a specific APS VCC. The two instances of the APS VCC of the group follow the same end-to-end paths as the protected circuits (from source to sink) and in particular

traverse the same intermediate nodes. When such an intermediate node detects a problem affecting the circuits associated with the VP/VC group, that intermediate node notifies the sink by sending an AIS OAM cell on the corresponding APS VCC. When the sink receives such a problem indication on the APS VCC of a specific
5 VP/VC group, the sink effects a protection switching for all member circuits of that VP/VC group. Therefore, the sink node only needs to monitor the APS VCCs of the different VP/VC groups for AIS indications.

ATM switching systems generally incorporate the ability to use the virtual path identifier/virtual channel identifier (VPI/VCI) value of each incoming ATM
10 cell to look up an entry in a lookup table corresponding to this VPC or VCC. There may physically be several lookup tables, for example, one per input port. However, their concatenation can logically be considered as a single lookup table. This entry in the lookup table determines, among other things, how the cell should be handled, for example, whether the cell should be forwarded or discarded, and, if the decision is that
15 the cell should be forwarded, to which output port of the switch, S_B for example, it should be forwarded.

The sink node of a 1+1 protected ATM circuit has two incoming "copies" of the protected circuit, each on a different port. Each such copy is mapped to a different entry in the lookup table, and both of those entries route the incoming
20 cells to the same outgoing circuit, for example, the circuit to node B. At any time, one of the entries for the incoming circuits will have the cells forwarded while the other entry will have them discarded. This results in having the cells from one copy of the incoming circuit forwarded to the output, and the cells from the other copy being discarded. A protection switching operation for this circuit thus changes the tagging in
25 one entry from "forward" to "discard" and changes the tagging in the other entry from "discard" to "forward."

This manipulation of the lookup table entries can be carried out by a software process in the switch processor, which also determines if a protection switching operation is required in the first place. If the event that triggered the
30 protection switching operation affects relatively few circuits, the processing time required to update the relevant lookup table entries is relatively small. However, when the event requires a protection switching operation for a large group of VCCs or

VPCs, the required processing time may be excessive. A hardware-based mechanism can speed up the effecting of a protection switching operation for a VP/VC group.

In order to support VP/VC groups efficiently, it is desirable that whenever the forward/discard status of a group changes, that that change be reflected in a single entry and not in the entry of every member circuit. This is achieved by creating a groups table that has two entries for every active group, one for each of the two instances of that group's member set. The entry specifies whether the cells for that instance of the member circuits of that group should be forwarded or discarded. The entry in the lookup table for each individual circuit references the corresponding entry in the groups table by means of a pointer. When a cell for that circuit arrives, the relevant entry in the groups table is accessed. If the accessed value is "discard," the cell is discarded. Otherwise, the cell is forwarded as specified in the specific lookup table entry for that circuit.

Thus a protection switching operation for a group requires only changing the value of the corresponding two entries in the groups table, a single operation regardless of the number of member circuits in the group. The groups table is implemented as part of the hardware circuitry of the switching system. The number of supported groups is arbitrary, and is determined by the size of the groups table and the number of bits allocated to the groups table pointer in the lookup table entry. This mechanism also supports VCCs or VPCs that are not members of any group. Specifically, a value of zero in the pointer field of the lookup table entry indicates that the corresponding VCC or VPC is not a member of a group, and that that VCC's or VPC's forward/discard status should be determined from the lookup table entry itself. Any other value of the pointer field constitutes a valid index into the group table.

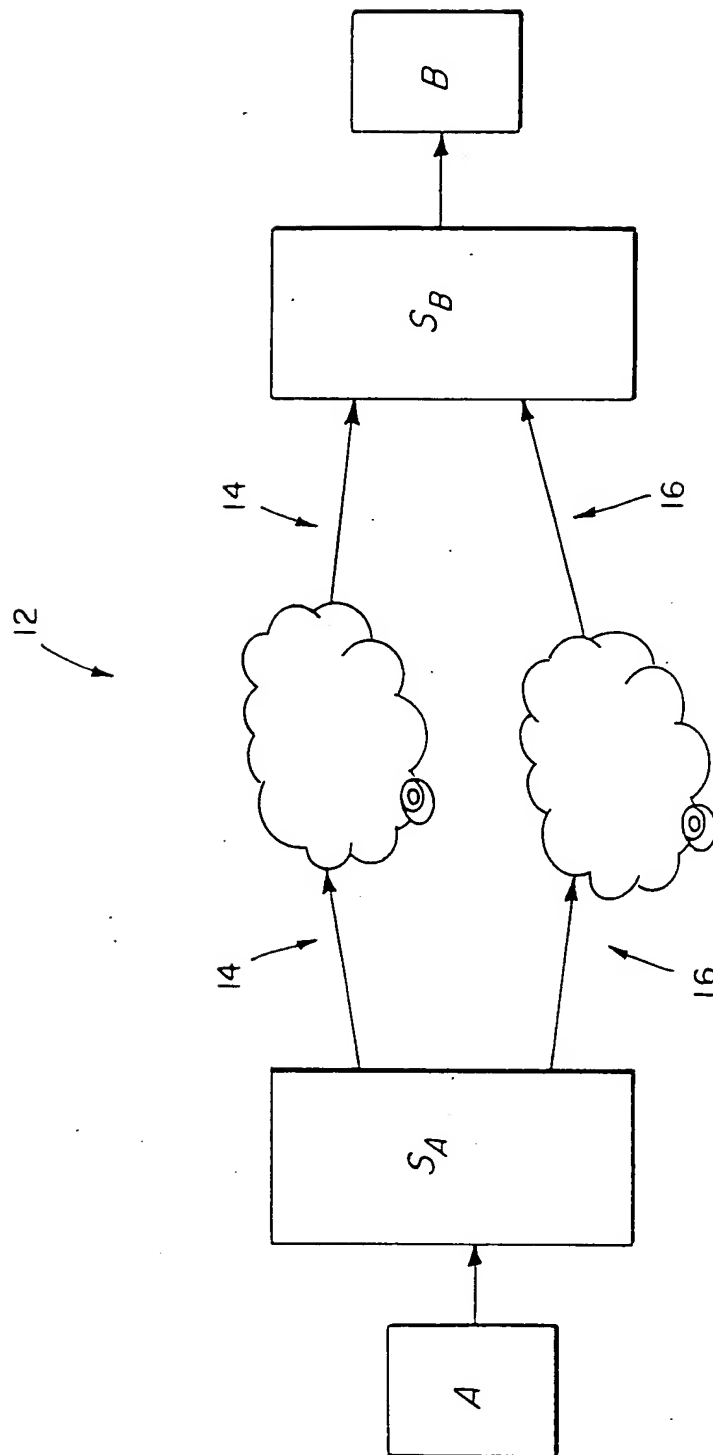
CLAIMS:

1. A method for supporting virtual path/virtual channel (VP/VC) groups in asynchronous transfer mode (ATM) switching systems that implement ATM automatic protection switching (APS) in which traffic flows substantially continuously from a source on two paths and a destination selects traffic from only one of the paths at a time for further processing, the method including creating a groups table, the groups table having an entry for each of the two instances of every active VP/VC group's member set, each said entry indicating whether the cells for that instance of the member circuits of that VP/VC group should be forwarded or discarded, each said entry referencing a corresponding entry in the groups table by means of a pointer, the method including accessing a relevant entry in the groups table when a cell for that circuit arrives, discarding the cell if the accessed value is "discard," and forwarding the cell otherwise.
2. The method of claim 1 wherein forwarding the cell includes maintaining a lookup table containing entries for forwarding cells, and forwarding the cell as specified in the specific lookup table entry for that circuit.
3. The method of claim 1 wherein the groups table is implemented as part of the circuitry of the switching system.
4. The method of claim 1 wherein the number of supported groups is determined in part by the size of the groups table.
5. The method of claim 2 wherein the number of supported groups is determined in part by the number of bits allocated to the groups table pointer in the lookup table entry.
6. The method of claim 1 wherein any value of the pointer field other than zero constitutes a valid index into the group table.
7. The method of claim 6 wherein a value of zero in the pointer field of the lookup table entry indicates that the corresponding VC circuit or VP circuit is not a member of a group, and that that VC circuit's or VP circuit's forward/discard status should be determined from the lookup table entry itself.

EFFICIENT SUPPORT FOR VP/VC GROUPS

Abstract of the Disclosure

5 A method for supporting VP/VC groups in asynchronous transfer mode
(ATM) switching systems that implement ATM automatic protection switching (APS).
A source transmits traffic substantially continuously on two paths and a destination, or
sink, selects at any time one of the traffic from only one of the paths for further
processing. The method includes creating a groups table having an entry for each of
10 the two instances of every active VP/VC group's member set. Each entry indicates
whether the cells for that instance of the member circuits of that VP/VC group should
be forwarded or discarded. Each entry references a corresponding entry in the groups
table by means of a pointer. The method includes accessing a relevant entry in the
groups table when a cell for that circuit arrives, discarding the cell if the accessed value
15 is "discard," and forwarding the cell as specified in the specific lookup table entry for
that circuit if the accessed value is otherwise. Protection switching for a group
requires only changing the value of the corresponding two entries in the groups table, a
single operation regardless of the number of member circuits in the group.



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 14 AUG 2001

WIPO

PCT

Applicant's or agent's file reference 20568-64504	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US00/00032	International filing date (day/month/year) 05 JANUARY 2000	Priority date (day/month/year) 12 JULY 1999
International Patent Classification (IPC) or national classification and IPC IPC(7): H04L 12/54 and US Cl.: 370/228, 235, 395, 396, 425		
Applicant CHROMATIS NETWORKS, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 27 JUNE 2000	Date of completion of this report 05 FEBRUARY 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer RICKY QUOC NGO <i>Randy Ward</i>
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4798

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US00/00032

I. Basis of the report

1. With regard to the elements of the international application:*

☒ the international application as originally filed☒ the description:

pages 1-5 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

☒ the claims:

pages 6 , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

☒ the drawings:

pages 1 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

☒ the sequence listing part of the description:

pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

☒ the description, pages NONE
☒ the claims, Nos. NONE
☒ the drawings, sheets/fig NONE

5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US00/00032

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)

Claims 1-7 YES
Claims NONE NO

Inventive Step (IS)

Claims 1-7 YES
Claims NONE NO

Industrial Applicability (IA)

Claims 1-7 YES
Claims NONE NO

2. citations and explanations (Rule 70.7)

Claims 1-7 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest the steps of creating a groups table having entry for each of the two instances of every active VP/VC group's member set, wherein each entry indicates whether the cells for that instances of the member circuits of that VP/VC group should be forwarded or discarded, and references a corresponding entry in the groups table by means of pointer; accessing a relevant entry in the groups table when a cell for that circuit arrives; discarding the cell if the accessed value is discard; and forwarding the cell otherwise.

Claims 1-7 also meet industrial applicability because the invention relates to protection of conventional ATM switching networks in the event of physical faults in the networks.

-----NEW CITATIONS-----

NONE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/00032**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :H04L 12/54

US CL :370/228, 235, 395, 396, 425

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/225, 228, 235, 236, 237, 395, 397, 409, 400, 412, 428, 429, 396, 429

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NoneElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,715,237 A (AKIYOSHI) 03 February 1998, cols. 3-12, 15, & 19-20.	1-7
A	US 5,870,382 A (TOUNAI et al) 09 February 1999, abstract.	1-7
A	US 5,663,949 A (ISHIBASHI et al) 02 September 1997, abstract.	1-7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

10 MARCH 2000

Date of mailing of the international search report

26 APR 2000

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
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RICKY QUOC NGO

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